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Is Science Very Different from Religion? A Polanyian Perspective

Polanyi argued that science had to be pursued as a personal passion within a fiduciary framework. His writings are used to demonstrate that science is not completely different from religion, although it is made out to be. Science and religion both use faith in order to act. Science, like religion, has indispensable subjective elements too, but that need not and does not preclude objectivity. In addition, science itself is often dogmatic and has a set of core commitments that do not change, similar to the core beliefs in religions. Finally, although science seeks the assent of all its practitioners while people are divided into many religions, there are times when science is and perhaps should be pursued within differing and even competing schools of thought.

Key words: alternatives, detachment, dogmatism, doubt, faith, paradigm, Polanyi, religion, science, subjectivity

Introduction

It has been cogently argued that a Christian world-view was largely instrumental in creating the scientific revolution in Europe,[1] with many leading scientists having been practising Christians and seeing their science as part of their devotion to God. However, since the European enlightenment, science has largely, though not completely, replaced religion as the grounds for our plausibility structures. On top of that, with the rise of wars and conflicts based on religious identities, there is a view expressed today that religion is positively dangerous rather than merely innocuous.[2]

This paper will examine some of the claims made for science against religion. It will then draw largely on the work of Michael Polanyi, among others, to show that many of the claims made for science are somewhat misplaced, and that there are many similarities between the practice of science and religion. It will argue that both science and religion are human pursuits for discovery and action.

The four claims to be addressed are as follows:

1. Science is based on verifiable facts, whereas religion rests on faith that is not amenable to verification.
2. Science is carried out in a way that the practitioner is detached from his

1 Alexander, D. *Rebuilding the Matrix: Science and Faith in the 21st Century*, Oxford: Lion (2001).
2 Dawkins, R. *The God Delusion*, Boston: Houghton Mifflin Harcourt (2006).

inquiry, whereas religion is characterised by practitioner subjectivity.
3. Science has had its theories overthrown by better ones, whereas religion is characterised by dogmatic attitudes.
4. Science seeks the assent of all its practitioners, while there are very contrasting views from one religion to another.

It is not the objective of this paper to argue that there are no differences at all between science and religion. However, given the popular perception that they are poles apart, as reflected in the above claims, the intention here is to show that the gulf between them is not unbridgeable. Polkinghorne refers to the 'cousinly' relationship between theology and science,[3] perhaps deliberately avoiding the adjective 'brotherly' or 'fraternal' that would depict a closer relationship. This paper assumes a working definition for religion as a belief system that involves a transcendental reality and personal experience. It makes some specific references to Christianity, the religion in the context of which Polanyi was writing.

Michael Polanyi

Michael Polanyi was born in Hungary in 1891 and began his career as a physician during the First World War. He later pursued his real love, which was chemistry, as a physical chemist at the Kaiser Wilhelm Institute in Berlin. He left Germany in the shadow of Nazism in the early 1930s to join the University of Manchester in England as Professor of Physical Chemistry. After a number of years in this post, he exchanged this Chair for that of Professor of Social Studies, despite having been elected a Fellow of the Royal Society. His last scientific paper appeared in 1949, but he had been publishing in economics and philosophy since 1935. When he retired from the University of Manchester, he worked for two years as a Research Fellow at Merton College in Oxford, where he lived and continued to write until his death in 1976. His three major books arose from lecture series he was invited to give, namely the Riddell Lectures at the University of Durham in 1946 (*Science, Faith and Society*),[4] the Gifford Lectures at the University of Aberdeen in 1951-52 (*Personal Knowledge*)[5] and the Terry Lectures in 1962 at Yale University (*The Tacit Dimension*).[6] His book titles are a good reflection of his concerns.

In many ways, Polanyi's philosophy of science was a critique of logical positivism, which held that sensory observation was the foundation of all genuine knowledge. Positivism was a product of the European enlightenment, which in turn was considerably influenced by René Descartes. Two of his key ideas

3 Polkinghorne, J. *Theology in the Context of Science*, London: SPCK (2008), p. xv.
4 Polanyi, M. *Science, Faith and Society*, Chicago: University of Chicago Press (1946).
5 Polanyi, M. *Personal knowledge: Towards a Post-critical Philosophy*, Chicago: University of Chicago Press (1958).
6 Polanyi, M. *The Tacit Dimension*, New York: Doubleday & Co. (1966).

found expression in positivism. One is the idea of *detachment*. The scientist was supposed to isolate himself from his inquiry, in order to rein in any prejudices he might have. In fact this detachment stems partly from the doctrine of Cartesian dualism (after Descartes), which holds that mind and matter are strictly separate entities. His other idea was that scepticism, also called *methodological doubt*, should be the hallmark of a scientist, in order to make sure that knowledge was certain. The scientific culture that faced Polanyi then was one that was obsessed with practitioner independent objectivity.

Polanyi's great concern was that both the foundations of science and the values of society were being eroded by an approach to epistemology based on such detachment and methodological doubt. His philosophy was shaped by his experience as a scientist, and his main thesis was that scientific knowledge contained an unspecifiable tacit element, supplied by the scientist's background, imagination and skill. Such *personal* knowledge, which involved a *fiduciary* (or faith-like) aspect too, was not merely subjective, however, because it was held with universal intent, and judged by the community of scientists.

Despite Polanyi's clear relevance for the science-religion debate or dialogue, he is somewhat of a forgotten philosopher. Denis Alexander[7] does not refer to him at all in his lengthy book. Neither does Fraser Watts,[8] the first Starbridge Lecturer in Theology and Natural Science at the University of Cambridge in his endowment lecture. Lesslie Newbigin[9] and Vinoth Ramachandra[10], however, both writing on Christian mission to a scientific culture, lean heavily on Polanyi. So does John Polkinghorne, who describes him as 'the philosopher of science who… has offered the most helpful account of the method and achievement of science.'[11]

Claim 1 – Science is based on verifiable facts, whereas religion rests on faith that is not amenable to verification

This claim for science is at least partly spurious and constitutes a diminishing of its intellectual stature. The point is that the observation or even the cataloguing of facts does not constitute science, which is primarily characterised by theories. Polanyi argued that theories were more objective than immediate experience because, (i) a theory was something other than one's self, (ii) a theory could not be led astray by one's personal illusions and (iii) a theory could be constructed disregarding one's normal approach to experience.[12] We should

7 Alexander *op. cit*., (1).
8 Watts, F. 'Are science and religion in conflict?', *Zygon* (1997) 32(1), 125-138.
9 Newbigin, L. *Foolishness to the Greeks: The Gospel and Western Culture*, London: SPCK (1986), pp. 65-94.
10 Ramachandra, V. *Gods that Fail: Modern Idolatry and Christian Mission*, Carlisle: Paternoster (1996), pp. 185-192.
11 Polkinghorne *op. cit*., (3), p. 23.
12 Polanyi *op. cit.*, (5), p. 4.

be suspicious of everyday experience, as it could give rise to subjectivity and indeed error:[13] it is such experience that suggests to us that the sun goes round the earth, for example.

In fact everyday experience is far removed from the frontiers that science is at right now, with quarks, superstrings, multiverses and dark energy. Such ideas are almost as difficult to believe as, for example, the central Christian religious claim that someone rose from the dead! As Polkinghorne says, 'Even the most bold of theological speculations scarcely exceed in daring the conjectures of the string theorists.'[14] He also says that the criterion for truth in science since the beginning of the twentieth century is not whether a proposition is 'reasonable' but whether a chain of logic can be presented for it,[15] and that truth claims in theology should be similarly presented. In other words, modern scientific descriptions of the world are highly counter-intuitive and require a considerable degree of intellectual assent to hold – assent that is not unlike faith. Eddington's tale of two tables[16] (quoted by Lipton)[17] conveys this difference between scientific description and everyday experience.

> I… have drawn up my chairs to my two tables. Two tables! Yes; there are duplicates of every object about me – two tables, two chairs, two pens… One of them has been familiar to me from earliest years…. It has extension; it is comparatively permanent; it is coloured; above all it is substantial…. Table No. 2 is my scientific table…. It does not belong to the world previously mentioned…. My scientific table is mostly emptiness. Sparsely scattered in that emptiness are numerous electric charges rushing about with great speed; but their combined bulk amounts to less than a billionth of the bulk of the table itself. Notwithstanding its strange construction it turns out to be an entirely efficient table. It supports my writing paper as satisfactorily as Table No. 1; for when I lay the paper on it the little electric particles with their headlong speed keep on hitting the underside, so that the paper is maintained in shuttlecock fashion at a nearly steady level.

It must be said however that scientists expect their theories to be verified or falsified by facts (as opposed to everyday experience), and in this sense facts could be seen as more 'basic' than theories, notwithstanding the argument that 'facts' could be theory-laden and accessed only through experimental apparatus too. Most religious 'theories' (e.g. the existence of God) are not amenable to testing in this manner. However, where Christianity is concerned, the resurrection of Christ is presented as a claim that can be tested by historical evi-

13 *ibid*, p. 183.
14 Polkinghorne *op. cit*., (3), p. 99.
15 Polkinghorne *op. cit*., (3), p. 19.
16 Eddington, A. *The Nature of the Physical World*, Cambridge: Cambridge University Press (1928), pp. xi-xii.
17 Lipton, P. 'Science and religion: The immersion solution', in Moore, A. & Scott, M. (eds) *Realism and Religion:Philosophical and Theological Perspectives*, Aldershot: Ashgate (2007), pp. 31-46.

dence (e.g. the missing body). Here of course it will be historical criteria that would be needed to evaluate them (e.g. circumstantial evidence, eyewitness accounts, time gap between events and earliest manuscripts), rather than 'scientific' ones.

Apart from being counter-intuitive, the grand enterprise of science itself requires intellectual extrapolation, again so much like the experience of faith – how can we believe that we who evolved from stardust are able comprehend the stars? Ramachandra argues that the assumptions required for the pursuit of science are like articles of faith,[18]

> namely (1) that there is a real world outside our minds, and that the world is structured in an orderly and intelligible way; (2) that this rational order is contingent, it cannot be deduced in advance by logical reasoning but has to be discovered, thus calling for a basic posture of humility before the world whose rationality we seek to articulate through our theories and experiments; and (3) that the intelligibility of the universe is accessible to the human mind: our epistemic abilities, though not unlimited, are adequate to this task.

Such assumptions cannot be tested. Rather, they are endorsed by the success of the scientific community. This is not dissimilar to religious adherents' claiming that their belief systems are authenticated by their shared mystical or practical experiences.

Now scientists do not merely hold on to their theories but act on them as well. Just as a stick becomes an extension of a blind man's arm when he uses it to explore a cave, a scientific theory is interiorised by a scientist when using it to make new discoveries.[19] Such interiorisation is akin to possessing a religious world-view. The focal awareness of the scientist is not on the theory but on the discovery. Nevertheless, he has a subsidiary awareness of the theory, enabling him to be critical of the theory if it is found wanting. This combination of focal and subsidiary awareness is what Polanyi called 'tacit knowing'.[20]

Similarly, true religion is also not so much a matter of *belief*, but of *action*. In the New Testament, it is said: 'Show me your faith without deeds, and I will show you my faith by what I do. You believe that there is one God. Good! Even the demons believe that – and shudder. You foolish man, do you want evidence that faith without deeds is useless?' (Jas 2:18-20). So, it is not the intensity of belief that is important, but rather acting on the little belief that one has. Earlier in the New Testament Jesus also suggests that faith need only be the size of a mustard seed: 'If you have faith as small as a mustard seed, you can say to this mulberry tree, 'Be uprooted and planted in the sea,' and it will obey you'

18 Ramachandra, V. *Subverting Global Myths: Theology and Public Issues Shaping our World*, Downers Grove: IVP Academic (2008), p. 181.
19 Polanyi *op. cit.*, (6), pp. 12-13 & 16-18.
20 *ibid.*, pp. 12-13.

(Lk. 17:6). While this emphasis on acting rather than merely giving mental assent to a set of beliefs is advocated in Christianity, it is probably the case with most other religions too.

In short, it can be argued that science is as faith-like as religion. In fact, Polanyi used the word 'fiduciary' extensively for describing how science should be practised. He was rejecting Descartes' methodology of doubt, pointing out that scepticism had led to error in the history of science, just as belief had. Hence, there was no universal guideline as to whether doubt or belief was better for scientific discovery;[21] tacit acts were neither critical nor uncritical, but rather *a-critical*.[22] However, Polanyi said that all experience, including that of scientists, was based on belief.[23] He likened this belief to religious faith, and quoted St Augustine who said '*nisi credideritis*, *non intelligitis*' (if you do not believe, you shall not understand).[24]

In summary then, although it was suggested that some claims of Christianity can be tested by historical evidence, the main argument to challenge Claim 1 is that science and religion both use faith (the conviction of things not seen) for discovery and action.

Claim 2 – Science is carried out in a way that the practitioner is detached from his inquiry, whereas religion is characterised by practitioner subjectivity

Polanyi said that knowing was a problem solving activity, and that we were driven to it by a *personal* involvement and a heuristic *passion*. This was the passion that directed the selection of a research problem.[25] Even animals, he said, displayed a passion to solve a puzzle that confronted them, despite not receiving a reward.[26] One of the passions that drove human beings was a desire for beauty, which was reflected in many fields of endeavour:[27]

> The affirmation of a great scientific theory is in part an expression of delight. The theory has an inarticulate component acclaiming its beauty, and this is essential to the belief that the theory is true…. A scientific theory which calls attention to its own beauty, and partly relies on it for claiming to represent empirical reality, is akin to a work of art which calls attention to its own beauty as a token of artistic reality…. In teaching its own kinds of formal excellence science functions like art, religion, morality, law and other constituents of culture.

21 Polanyi *op. cit*., (5), pp. 274-277.
22 *ibid*., p. 264.
23 *ibid*., p. 283.
24 *ibid*., p. 266.
25 *ibid*., p. 159.
26 *ibid*., p. 98.
27 *ibid*., p. 133.

Great scientists such as Kepler and Einstein had a great passion for intellectual beauty in their theories.[28] Polanyi also said that scientists had a persuasive passion[29] for having their theories accepted by others, and that this sometimes generated scientific controversies.

Polanyi thus argues not only that science is based on faith but also that it is driven by personal passions. There were two problems raised by this position. The first was that of circularity, since one would be voicing one's ultimate convictions from within that conviction. This did not seem to bother Polanyi, who said that even a dictionary was circular, where a word was defined using a chain of other words that could lead back to the original word.[30] The second problem was the ensuing dogmatism. Here, Polanyi quoted Tillich, a Christian theologian who said 'Faith embraces itself and the doubt about itself',[31] suggesting that faith could include an element of doubt as well. Furthermore, Polanyi said that dogmatism could be corrected by both internal and external controls. However, a science which proceeded by a de facto faith while claiming not to, would possess a dogmatism that could not be checked.[32]

Although there were many personal elements involved in scientific knowledge, Polanyi said that it was held with universal intent. In other words, scientists performed the 'integrations' of their clues to arrive at conclusions regarding an external reality they felt others could arrive at too. This required a commitment equivalent to a personal moral responsibility, which a mechanical process of scientific induction would not require.[33] He likened this to the decision arrived at by a judge:[34]

> We can watch the mechanism of commitment operating on a minor scale, and yet revealing all its characteristic features, in the way a judge decides a novel case. His discretion extends over the possible alternatives left open to him by the existing explicit framework of the law, and within this area he must exercise his personal judgment. But the law does not admit that it fails to cover any conceivable case. By seeking the right decision the judge must find the law, supposed to be existing – though as yet unknown. This is why eventually his decision becomes binding as law. The judge's discretion is thus narrowed down to zero by the stranglehold of his own universal intent – by the power of his responsibility over himself.

We see here that the freedom of the *subjective* person to do as he pleases is overruled by the freedom of the *responsible* person to act as he must. Note, however, that there would have been no responsibility if there was no inde-

28 *ibid*., pp. 142-145.
29 *ibid*., p. 159.
30 *ibid*., p. 289.
31 *ibid*., p. 280.
32 *ibid*., p. 268.
33 *ibid*., p. 153.
34 *ibid*., pp. 308-309.

pendence. Another way of putting it is that scientific progress required a scientific conscience in addition to creative impulses and critical caution.[35] Polanyi said that criteria such as simplicity, symmetry and economy, although held out as objective standards for appraising theories, always involved subjective judgments.[36] There is similarity here to Kuhn's criteria regarding theory choice,[37] also referred to later in this paper. The work of a scientist then was like that of a skilful performer fulfilling essentially self-set standards.[38]

Polanyi's description of the judge's commitment and responsibility in fact seems to dissolve the distinction he makes between detachment and passion. Nevertheless, it is clear that science requires the personal involvement of the scientist, not merely to interpret data, but also to posit 'bold conjectures'.

Although knowledge was therefore *personal*, Polanyi said that it was not merely *subjective*, because (i) it made reference to an external reality and (ii) it was held in the belief that others could arrive at it as well. He did say, however, that such belief could be mistaken. In addition, even if it were true, its future scope and significance would be largely indeterminate; this was a characteristic of theoretical knowledge.[39] At any rate, Polanyi affirmed that 'man can transcend his own subjectivity by striving passionately to fulfil his personal obligations to universal standards'.[40]

Fraser Watts[41], too, resonates strongly with Polanyi, stating that 'The fact that subjectivity is involved does not mean that objectivity is impossible to achieve. This idea that subjectivity and objectivity are polar opposites is part of our intellectual inheritance from the early modern period, a holdover that I believe we need to shake off'; and again, 'the development of a particular scientific picture is a matter of interpretation, not just of the accumulation of facts'.

According to Popper, however, subjectivity in science is desirable mainly at the 'bold conjecture' stage, whereas the critical testing stage calls for a high degree of objectivity.[42] This is roughly parallel to the tension between personal passion and universal intent for Polanyi. Where religion is concerned, however, many arguments for authentication are based on personal experience, albeit shared.

In summary then, it must be admitted that religion is probably less objec-

35 Polanyi *op. cit*., (4), p. 41.
36 Polanyi *op. cit*., (5), p. 16.
37 Kuhn, T.S. *The Essential Tension: Selected Studies in Scientific Tradition and Change*, Chicago: University of Chicago Press (1977), pp. 321-322.
38 Polanyi *op. cit*., (5), p. 63.
39 *ibid*., p. 316.
40 *ibid*., p. 17.
41 Watts *op. cit*., (8)
42 Popper, K.R. *Conjectures and Refutations: The Growth of Scientific Knowledge*, 5th edn., London: Routledge (1989), pp. 242-245.

tive than science. However, Claim 2 can be challenged because we see that science too has indispensable subjective elements, like religion; however, that need not and does not preclude objectivity.

Claim 3 – Science has had its theories overthrown by better ones, whereas religion is characterised by dogmatic attitudes

Another very interesting similarity between science and religion, alluded to by both Kuhn and Polanyi, is the rigorous schooling in a tradition (or the ruling paradigm as Kuhn called it) and the idea of learning in community (described by Polanyi).

The community was very important for Polanyi's epistemology. One of its major roles was the bearing of tradition. If tacit knowing depended on the indwelling or interiorising of a framework of knowledge, a community was required to sustain that framework. This, according to Polanyi was achieved through the process of education, where knowledge was imparted, and the authority, both of that knowledge and that of its practitioners, was recognised by students. Polanyi compared scientific education with religious instruction on the one hand and craft apprenticeship on the other. They all took place within communities. The comparison with religious instruction highlighted the aspect of voluntary submission to a set of ultimate values; it was such submission in fact that in turn sustained the community[43] and gave rise to cooperation between its members in a spirit of conviviality.[44]

Kuhn, too, described the way that scientists were educated. The student was trained essentially on text books, which contained bodies of established knowledge. Scientists were not exposed to cutting edge knowledge (in journals for example) until very late in their training. In addition, science textbooks contained little if any description of the historical development of their subject matter. Paradigms or frameworks that had operated previously were not considered important; only the prevailing one was.[45] There was very little scope for teaching students to discriminate among different points of view, because all scientific textbooks in a given field had the same point of view – namely, the one based on the ruling paradigm.[46] The objective was to school the students into a very definite mould – that of the ruling paradigm. Such education has been described by Kuhn as 'a narrow and rigid education, probably more so than any other except perhaps in orthodox theology'.[47]

A scientific education, therefore, in fact promoted a spirit of dogmatism.

43 Polanyi *op. cit*., (4), p. 64.
44 Polanyi *op.cit.*, (5), p. 212.
45 Kuhn, T.S. *The Structure of Scientific Revolutions*, 2nd edn., Chicago: University of Chicago Press (1970), pp. 165-166.
46 Kuhn *op. cit*., (37), p. 229.
47 Kuhn *op. cit*., (45), p. 166.

Words such as 'faith', 'trust' and 'taken for granted' figure in Kuhn's writings;[48] such words are more usually associated with religious faith. However, Kuhn argued that such faith and dogmatism created the background within which error or anomaly could 'stick out'[49] and lead to a change in the paradigm. The very rigidity of the tradition ensured the shattering of that selfsame tradition. He endorsed Bacon's maxim that 'truth emerges more readily from error than from confusion'[50] in preferring a single paradigm to govern normal science rather than to have several simultaneous alternatives, as preferred by Feyerabend[51] and Lakatos.[52]

The above arguments go to show then, that dogma, at least of a particular sort, is very much a part of science, with both Polanyi and Kuhn alluding to the way in which that aspect makes a scientific community not unlike a religious one.

It is clear, however, that there have been many changes in the ruling paradigm where science is concerned. Kuhn called these scientific revolutions. Popper used the notion of falsifiability to distinguish between science and non-science. He was deeply influenced by the attitude of Einstein in arriving at his epistemology and wrote thus[53] in his intellectual autobiography:

> But what impressed me most was Einstein's own clear statement that he would regard his theory as untenable if it should fail in certain tests. Thus he wrote for example: 'If the redshift of spectral lines due to the gravitational potential should not exist, then the general theory of relativity will be untenable.' Here was an attitude utterly different to the dogmatic attitude of Marx, Freud, Adler, and even more so that of their followers. Einstein was looking for crucial experiments whose agreement with his predictions would by no means establish his theory; while a disagreement, as he was the first to stress, would show his theory to be untenable. This I felt was the true scientific attitude. It was utterly different from the dogmatic attitude which constantly claimed to find 'verifications' for its favourite theories. Thus I arrived… at the conclusion that the scientific attitude was the critical attitude, which did not look for verifications but for crucial tests; tests which could refute the theory tested, though they could never establish it.

48 Hoyningen-Huene, P. *Reconstructing Scientific Revolutions: Thomas S. Kuhn's Philosophy of Science*, Chicago: University of Chicago Press (1993).
49 Kuhn *op. cit*., (37), pp. 234-237.
50 Kuhn *op. cit*., (45), p. 18.
51 Feyerabend, P. 'How to defend society against science', in Hacking, I. (ed.) *Scientific Revolutions*, Oxford: Oxford University Press (1981), pp. 156-167.
52 Lakatos, I. 'History of science and its rational reconstructions', in Hacking, I. (ed.) *op. cit*., (51), pp. 107-127.
53 Popper, K.R. *Unended Quest: An Intellectual Autobiography*, Glasgow: Fontana, 1976, p.38.

It would appear on the surface that religions do not set out to falsify their core beliefs in the same way that Popper advocates for science. However, almost all religions involve interpretation, and many religions, especially Christianity, have undergone major changes in the way their teachings and practices are promoted among adherents. For example, there have been significant changes in attitudes to issues such as slavery, women's rights and environmental protection. The Roman Catholic church saw significant shifts in theology after the Second Vatican Council. Polkinghorne gives an example of how the church jettisoned a third-century theory of Origen's regarding the atoning work of Christ.[54] These changes could be seen as arising from the 'critical testing' and 'overthrowing' of religious hypotheses, not unlike what happens in science.

How about the core religious beliefs, though? In Christianity for example this would be the idea of a creator God who has revealed himself to man. For religion more generally, a common core belief would probably be the affirmation of a transcendental ultimate reality. It is unlikely that such beliefs will change, because that would constitute an abandoning of the entire project. However, science too has such unchanging phenomena, not so much in its theories or paradigms as in its unstated assumptions (e.g. as reflected in the quotation from Ramachandra earlier in this paper) and in its defining criteria. Such criteria are often used to judge between competing paradigms, just as the core beliefs in a religion will be used to judge between peripheral ones.

Kuhn, for example, has suggested five such criteria,[55] without intending them to be exhaustive, namely:

(i) accuracy: with respect to the predictions made by the theory;
(ii) consistency: with regard to elements both internal to the theory and external to it (for example, the way it fits in with other theories in science, even in different fields, or even with a metaphysical position);
(iii) scope: which is the amount of phenomena that is explained by the theory;
(iv) simplicity: which is almost an aesthetic and hence metaphysical idea, but one which almost all scientists would subscribe to;
(v) fruitfulness: which relates to the promise of continuing scientific activity, and not necessarily associated with correspondence with the world (the way the first three criteria are).

So, in summary, Claim 3 is challenged by arguing that science itself is often dogmatic and that it too has a set of core commitments that do not change; also that changes in a religion's teachings, practices or even emphases may be similar to the overthrowing of hypotheses.

54 Polkinghorne *op. cit*., (3), p. 26.
55 Kuhn *op. cit*., (37), pp. 321-322.

Claim 4 – Science seeks the assent of all its practitioners, while there are very contrasting views from one religion to another

The distinction portrayed in this claim is not as clear cut as it sounds. The notion that science has the assent of all its practitioners has been best articulated by Kuhn. Kuhn defined pre-normal science[56] as an immature science, where different competing schools each had their own framework of research. A science moved from a pre-normal stage to a normal stage when one of the competing schools was victorious over the others. This happened when the victorious school could show that their framework explained the fundamental problems in the field better than the others did, and was able to attract the main scientists to follow its lead. It is this convergence on a paradigm that makes normal science such a productive exercise with many scientists focused on solving diverse problems but all within the same overarching paradigm. It is this unanimity also that creates a community of scientists, one that transcends national and other identities.

However, whenever there are disputes in the fundamentals of a field, science is characterised by competing views. Although Kuhn calls this pre-normal science or crisis in an existing science, Lakatos[57] and Feyerabend[58] advocate simultaneous alternatives at all times. In fact, Feyerabend considers science dangerous because it shuts out alternative explanations.[59] Recently, the theoretical physicist Lee Smolin[60] appealed to Feyerabend's ideas to get scientists to pursue alternatives to the ruling paradigm of string theory, describing how scientists with differing views have found it difficult to get faculty positions in American universities, despite the fact that string theory has not been significantly productive for quarter of a century.

Religions are of course widely accepted as having contrasting doctrines, but at least one of the aims of the discipline of comparative religion is the identification of common themes and teachings in various religions, despite their very differing world-views. So, issues of good and evil, and life and death are dealt with in all religions, albeit in differing ways. Polkinghorne suggests that such differences may be seen as similar to how physicists maintained both the wave and particle theory of light from 1900 to 1925, until the paradox was resolved by quantum theory.[61] At the same time, adherents of many religions commend their faith to others of different persuasion, presumably because they feel that others need to be led to their truth – in other words, they seek universal assent. At times the propagation of faith has unfortunately been associated with

56 Kuhn *op. cit*., (45), pp. 10-22.
57 Lakatos *op. cit*., (52).
58 Feyerabend, P. *Against Method: Outline of an Anarchistic Theory of Knowledge*, London: NLB (1975).
59 Feyerabend *op. cit*., (51).
60 Smolin, L. *The Trouble with Physics*, London: Penguin (2006), pp. 289-307.
61 Polkinghorne *op. cit*., (3), p. 101.

allurement or even violence. It is perhaps for this reason that modern societies have consigned religion to a relativistic private sphere, suggesting that it is not important what you believe but rather that your belief is able to help or ennoble you. This position is of course rejected by many, but by no means all, adherents, who contend that the truth claims of religions are important and 'real', at least to the extent that scientists attribute a realist position for science. This then makes it important to debate such truth claims in the public square, in a similar way to that in which contrasting scientific theories are.

So, Claim 4 can be challenged because there are times when science is and perhaps should be pursued within differing and even competing schools of thought, though admittedly the goal of science is to converge on consensus. Religions too have contrasting similarities to science – on the one hand displaying common ground at some sort of metalevel, while on the other seeking to defend their truth claims in the public square while adopting a realist position.

Closure

Despite its enormous success, Polanyi considered that an overcritical approach to science, characterised by detachment and doubt, had destroyed its very foundations. So he wrote:[62]

> The critical movement, which seems to be nearing the end of its course today, was perhaps the most fruitful effort ever sustained by the human mind. The past four or five centuries, which have gradually destroyed or overshadowed the whole medieval cosmos, have enriched us mentally and morally to an extent unrivalled by any period of similar duration. But its incandescence has fed on the combustion of the Christian heritage in the oxygen of Greek rationalism, and when this fuel was exhausted the critical framework itself burnt away.

This paper has used Polanyi's work, and also those of other well known twentieth-century philosophers of science to argue that science and religion are not as different as they are made out to be, even (or especially?) where a strongly faith based religion like Christianity is concerned. The main approach has been to show that science is similar to religion, although the reverse similarity has also been dealt with. Polanyi's main contribution to this debate is his argument that science has to be pursued as a personal passion within a fiduciary framework.

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62 Polanyi *op. cit*., (5), pp. 265-266.